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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,173	11/25/2003	Eun-Bong Han	102-1003	4330

38209 7590 05/25/2006

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EXAMINER

LIANG, LEONARD S

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 05/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/720,173

Applicant(s)

HAN, EUN-BONG

Examiner

Leonard S. Liang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 6, 8-11, 19, 20, 24, 25 and 31 is/are rejected.
- 7) ☒ Claim(s) 3, 5, 7, 12-18, 21-23 and 26-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4, 6, 8, 24-25, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by the applicant's admitted prior art.

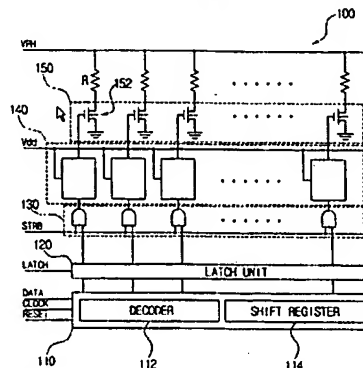
The applicant's admitted prior art discloses:

- {claim 1} An inkjet printer head driving apparatus having a plurality of heating elements and nozzles (figure 1, reference 100); a switching unit turning on and off each of the heating elements to heat ink corresponding to selected nozzles to eject the ink (figure 1, reference 150); a level shift unit having a level converter converting a potential level of a signal inputted therein into a predetermined potential level to drive the switching unit, and a transient time extending part provided with at least one time extending element to extend by a predetermined time a transient time during which the potential level of the signal inputted from the level converter to the switching unit is converted from a first signal level to a second signal level and vice versa (figure 1-2, reference 140); a control unit receiving an external data signal, decoding the received data signal, and outputting the decoded data signal as a nozzle selection signal to the level shift

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unit to select the selected nozzles corresponding to a to-be-recorded image from the nozzles (figure 1, reference 110)

FIG. 1
(PRIOR ART)



- {claim 4} wherein the transient time extending part comprises a first inverter inverting the signal outputted from the level converter (figure 2, reference INV1); and a second inverter extending the transient time from the first signal level to the second signal level or a second transient time from the second signal level to the first signal level in correspondence to an output signal of the first inverter (figure 2, reference INV2)
- {claim 6} A control method of an inkjet printer head driving apparatus having a switching unit driving heating elements corresponding to selected nozzles to eject ink through selected nozzles (figure 1, reference 150); outputting a nozzle selection signal to select nozzles corresponding to a to-be-recorded image out of the plural nozzles; receiving an inputted signal corresponding to the nozzle selection signal and converting a level of the inputted signal to a predetermined potential level to drive the switching unit; extending a transient time by a predetermined time in accordance with an output signal generating when the

level of the inputted signal is converted, the transient time being a time period during which the level is converted from a first signal level to a second signal level and vice versa; and driving the heating elements corresponding to the selected nozzles to eject the ink through the selected nozzles based on the output signal from the transient time extending operation (figure 1-2, reference 140; Specification paragraph 0006-0014)

- {claim 8} An inkjet printer head driving apparatus having a plurality of heating elements and nozzles (figure 1, reference 100); a control unit generating a control nozzle selection signal to select a heating element and a nozzle corresponding to an image to be printed (figure 1, reference 110); a level shift unit generating a first nozzle selection signal having a first transient time, during which a level of the first nozzle selection signal is changed between first and second levels, in response to the control nozzle selection signal, and generating a second nozzle selection signal having a second transient time extended by a period from the first transient time (figure 1-2, reference 140); and a switching unit turning on and off the heating element according to the second nozzle selection signal (figure 1, reference 150)
- {claim 24} wherein the switching unit comprises an FET, and a turning-on time of the FET is delayed by the period during which the first transient time of the first nozzle selection signal is extended to the second transient time of the second nozzle selection signal, to provide a sufficient time to charge and discharge a

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parasitic capacitance around the FET (figure 1, reference 152; specification paragraph 0006-0014, 0020)

- {claim 25} wherein the control nozzle selection signal comprises on and off signals to turn on and off the switching unit corresponding to the heating element, the level shift unit comprises a level converter to convert the control nozzle selection signal into the first nozzle selection signal having the first and second levels which are different from the on and off signals in signal level respectively (paragraph 0006-0025)
- {claim 31} An inkjet head driving unit (figure 1); a control unit to generate a nozzle selection signal to select a nozzle having a heating element (figure 1, reference 110); a level shift unit to convert the nozzle selection signal to have a predetermined level to drive the heating element between a logic high and a logic low and having one or more logic units to increase a time required to change an output thereof between the logic high and the logic low (figure 1-2, reference 140); and a switching unit to turn the heating element on and off according to the output of the level shift unit (figure 1, reference 150)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 9-11, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Hiwada (US Pat 6273537).

The applicants admitted prior art discloses:

- {claim 2} The inkjet printer head driving apparatus (as applied to claim 1 above)
- {claims 9-11} The inkjet printer head driving apparatus (as applied to claim 8 above)
- {claim 10} wherein the switching unit comprises a transistor having a first terminal coupled to the level shift unit, a second terminal coupled to the heating element, and a third terminal connected to a potential, and the residual voltage of the switching unit is a voltage of the first terminal (figure 1, reference 150)
- {claim 19} The inkjet printer head driving apparatus (as applied to claim 8 above); the first nozzle selection signal comprises a previous first nozzle selection signal and a current first nozzle selection signal, and the second nozzle selection signal comprises a previous second nozzle selection signal and a current second nozzle selection signal corresponding to the previous first nozzle selection signal and the current first nozzle selection signal of the first nozzle selection signal, respectively, and the voltage of the switching unit is a residual voltage remaining in the switching unit when the switching unit is turned off according to the previous second nozzle selection signal (specification paragraph 0006-0025)
- {claim 20} The inkjet printer head driving apparatus (as applied to claim 8 above); wherein the voltage of the switching unit is another residual voltage

remaining in the switching unit when the switching unit is turned off according to the current second nozzle selection signal (specification paragraph 0006-0025)

The applicant's admitted prior art differs from the claimed invention in that it does not disclose:

- {claim 2} a discharging part discharging a residual voltage of a signal inputted from the level shift unit to a gate of the switching unit if the switching unit switching on and off the heating elements is turned off
- {claim 9} a discharging part discharging a residual voltage of the switching unit according to the first nozzle selection signal and/or the second nozzle selection signal
- {claim 10} the switching unit comprises a transistor having a first terminal coupled to the discharging part
- {claim 11} the discharging part is coupled to the level shift unit to receive the first and second nozzle selection signal so that the residual voltage of the switching unit is discharged according to at least one of the first transient time of the first nozzle selection signal and the second transient time of the second nozzle selection signal when the switching unit is turned on and/or off according to the second nozzle selection signal

Hiwada et al discloses, with respect to claims 2 and 9-11, a discharging part attached to a print head drive circuit (figure 7, reference 3; column 7, lines 65-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Hiwada et al into the invention of the

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applicant's admitted prior art. The motivation for the skilled artisan in doing so is to gain the benefit of discharging the current that flows through the level shift unit. The combination naturally suggests:

- {claim 2} a discharging part discharging a residual voltage of a signal inputted from the level shift unit to a gate of the switching unit if the switching unit switching on and off the heating elements is turned off
- {claim 9} a discharging part discharging a residual voltage of the switching unit according to the first nozzle selection signal and/or the second nozzle selection signal
- {claim 10} the switching unit comprises a transistor having a first terminal coupled to the discharging part
- {claim 11} the discharging part is coupled to the level shift unit to receive the first and second nozzle selection signal so that the residual voltage of the switching unit is discharged according to at least one of the first transient time of the first nozzle selection signal and the second transient time of the second nozzle selection signal when the switching unit is turned on and/or off according to the second nozzle selection signal

Allowable Subject Matter

Claims 3, 5, 7, 12-18, 21-23, and 26-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 3, 5, 7, 12-18, 21-23, and 26-30 disclose subject matter, which was not found, taught, or disclosed in the prior arts.

Response to Arguments

Applicant's arguments filed 03/16/06 have been fully considered but they are not persuasive.

The applicant's main argument is that although "additional logic such as the level converter 142 would add to a propagation delay of the level shift unit 140, it would still take the level shift unit 140 the same amount of time to change between output levels (i.e. logic high and logic low). The additional logic would simply delay the actual change between a first output level and a second output level with respect to a point in time at which an input signal is received at the level shift unit 140. The amount of time it takes the level shift unit 140 to change between the first output level and the second output level would not be affected, because the output of the level shift unit would simply remain at the first output level for an additional amount of time that corresponds to the propagation delay attributable to the level converter 142, before beginning to change to the second output level." As such, the applicant contends that the admitted prior art fails to disclose a level shift unit having a level converter converting a potential level of a signal inputted therein into a predetermined potential level to drive the switching unit, and a transient time extending part provided with at least one time extending element to extend by a predetermined time a transient time during which the potential level of the signal inputted from the level converter to the switching unit is converted from a first signal level to a second signal level and vice versa.

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The examiner maintains that given the broadest reasonable interpretation of the claimed invention, examiner's prior rejection in light of the applicant's prior art is proper. The examiner fears that the prior explanation involving the delay of the level converter 142 may not have completely illuminated to the applicant why applicant's admitted prior art is considered to read on the claimed invention. The examiner will attempt to further clarify the record to help dispel any misunderstandings.

The applicant is correct about the function of the delay of level converter 142, in itself. However, what the applicant overlooks is that the function of level converter 142 must be viewed in the context of the additional logic found in buffer 144. It is level converter 142 and buffer 144 operating in conjunction, which forms level shift unit 140. Rather than argue the applicant's arguments from the perspective of the delay of level converter 142, it might be more helpful to compare the logic in buffer 144 with the logic found in applicant's transient time extending part 243. In figure 6, the applicant has divided transient time extending part 243 into a left part (first inverter 244) and a right part (second inverter 245). The second inverter 245 consists of first PMOS 245a, second PMOS 245b, first NMOS 245c, second NMOS 245d. The applicant will appreciate that the left part of buffer 144 of the applicant's admitted prior art is identical to the first inverter 244 of figure 6. Therefore, what needs to be compared is the right part of buffer 144 with second inverter 245. Although the right part of buffer 144 does not disclose a second PMOS and second NMOS, it does disclose a first PMOS and first NMOS. What this means is that figure 2 does perform some function of extending transient time, although the extent of this function may be minimal or even negligent when compared to the time extending characteristics of transient time extending part 243.

This is why the examiner previously mentioned the broadness of the claims. The claimed invention, at least as defined in the independent claims, do not quantify or give bounds to the extent of the time extending element. They simply state that there is a time extending element. What this means is that although the level shift unit of the applicant's prior art may not have a significant time extending element when compared with the time extending element of figure 6, there is a time extending element if figure 6. This is further demonstrated in figure 4. Although it's hard to see because of the small size of the figures, there is a transient time extending element, although it's not as pronounced in effect as references "D" and "E" of figure 7.

Furthermore, the examiner would like to note that the applicant has not really defined "transient time" in the claimed invention. It appears that the applicant is attempting to narrow the scope of the claimed invention by reading in the definition of "transient time" as characterized by the specification.

For these reasons, the prior rejection is deemed to be proper.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S. Liang whose telephone number is (571) 272-2148. The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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STEPHEN MEIER
SUPERVISORY PATENT EXAMINER